From Theory to Research Questions

Companion to the Week 3 episode. A clear concept isn't a study yet — turn it into a question you can actually answer.

1. The one idea

A good research question fixes **who** you study, **what** you compare, **which** outcome counts, and **what kind** of question it is (descriptive/inferential, exploratory/confirmatory). A fuzzy question makes a fuzzy study that no later rigour can fix.

2. Descriptive vs inferential

	Descriptive	Inferential
Asks	"What is the case?" (variation, typical error, normal ranges)	"Does X relate to / affect Y?" (a comparison, generalising beyond the sample)
Design	Observation / measurement	Comparison group, ideally intervention
Common error	Running a *descriptive*, observational study and then claiming an *inferential / causal effect* it was never built to detect. **Match the question to the design from the start.**	

3. Three checks before it's a real question

Check	Ask
Scope	Is it narrow enough to answer? ("Does strength training improve performance?" is an *area*, not a question.)
Feasibility	Can you actually resource it — athletes, time, equipment, ethics? (Sample size can decide if it's answerable at all — Week 7.)
Uncertainty reduction	What would this genuinely tell us we don't already know? If "nothing", don't run it (research waste).

4. PICOT — a clarity-forcing scaffold (Richardson et al., 1995)

Fill in each letter and the vagueness has nowhere to hide.

P — Population	Who, exactly? *e.g., trained adolescent male sprinters*
I — Intervention	What precisely (dose/protocol)? *e.g., 4 weeks creatine supplementation*

C — Comparison	Vs what? (often forgotten — no inference without it) *e.g., placebo*
O — Outcome	Which measured outcome (a good bridge to the construct?) *e.g., 30-m sprint time*
T — Timeframe	Over what period, measured when? *e.g., end of loading period*

Assembled: "In trained adolescent male sprinters, does 4 weeks of creatine (vs placebo) improve 30-m sprint time, measured at the end of loading?" — now you can design a study around it. *(Illustrative template, not an endorsed protocol.)*

5. The distinction that changes everything

	Confirmatory	Exploratory
What it is	Tests a **pre-specified** prediction; looked at **once**	**Searches** the data for patterns; generates hypotheses
Both are…	**Legitimate and essential** (Wagenmakers et al., 2012). Exploration is the engine of discovery.	
The sin	Reporting **exploratory** work **as if** confirmatory.	

Worked illustration: correlate 15 monitoring variables (sleep, HRV, load, jump…) against match performance and you will find "significant" hits *by chance alone*. Fine as *exploration*. Writing "we hypothesised HRV predicts performance and confirmed it" is the catastrophe — a lucky pattern dressed as a prediction. A documented driver of unreliable findings (see Week 1; Mesquida et al., 2022).

6. Do this — this week

Build your question

1. Write it in **plain language** — the actual thing you want to know.
2. Structure it with **PICOT** — fill every letter; watch the gaps appear.
3. Label it: descriptive or inferential? confirmatory (pre-specified, tested once) or exploratory (a search, reported as such)?
4. Answer out loud: **"what would answering this tell us that we don't already know?"** If you can't, keep refining.

References

Richardson, W. S., Wilson, M. C., Nishikawa, J., & Hayward, R. S. (1995). The well-built clinical question: a key to evidence-based decisions. *ACP Journal Club, 123*(3), A12–A13.
Wagenmakers, E.-J., Wetzels, R., Borsboom, D., van der Maas, H. L. J., & Kievit, R. A. (2012). An agenda for purely confirmatory research. *Perspectives on Psychological Science, 7*(6), 632–638.

Mesquida, C., Murphy, J., Lakens, D., & Warne, J. (2022). Replication concerns in sports and exercise science. *Royal Society Open Science, 9*(12), 220946.
